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covered exactly resembling an early stage of the developing sporules, which points matured into the flagellate state. Farther experiments demonstrated that a heat, without dryness, of 66° C. destroys all the adult forms, while young monads appear and develop in an infusion which has been heated to 127° C., suggesting that the *sporules are uninjured by a temperature which is destructive to the adult.*

After this history, whose importance, if verified by subsequent observation, can scarcely be over-estimated, a history of a monad multiplying by subdivision, reproducing by conjugation (a true sexual reproduction of an extremely simple type), and actually seen to develop from sporules invisible under the powers usually employed in such investigations, and indestructible by heat which is fatal to the adult forms, it seems almost a waste of time to read of experiments with boiled infusions in sealed flasks, and we are rather inclined to wait patiently until Powell and Lealand or Tolles, or some one else, shall give us a lens capable of reading the life-history, whatever it may be, of Bacteria and Vibriones.—R. H. W.

BOTANY.

PERFORATION OF GERARDIA PEDICULARIA BY BEES.—I have always been much interested in the pretty genus Gerardia, largely represented in the vicinity of Providence, R. I. In the summer of 1871, while sitting amidst a dense growth of *G. pedicularia*, I noticed that all the humble-bees which visited the flowers alighted on the outside near the base of the corolla. I could not account for so singular an action, as the aperture to each bell was so wide. I found upon examination that the corolla in each case was pierced on the upper side near the junction with the calyx. I sent a note in regard to the matter to W. H. Leggett, Esq., of New York, and it appeared in the "Bulletin of the Torrey Club." The editor remarked that it was the first case, in his knowledge, of our native flowers being slit in this manner by visiting insects.

Not satisfied with what I then saw, I have watched the plants again this year with much attention, often sitting among them for an hour or more with the bees buzzing about my head. I should say that they were all humble bees, and I have seen but one of them approach the natural opening of the flowers. This was a much larger bee than any of the others. None of them had their legs dusted with pollen. On one occasion I saw a small metallic green and iridescent bee among the flowers, but could not observe whether he entered them. The sweet odor of the flower is very heavy and oppressive.

Why should these insects perforate the corolla when the flower is apparently so easy of access in the usual way? Examination of the structure does not throw much light upon the matter. The corolla is bell-shaped and of funnel form. There are four stamens, two long and two short, the filaments clothed with hairs, which are probably bathed with nectar, as the perforation is made just above them. The anthers are two-celled, approaching by pairs, and each cell has a sharp cusp at the bottom, pointing inwards. The style is long, and the stigma is bent over the longer stamens. I find, upon inserting a pencil into the mouth of the flower, that, upon retracting it, it is brought in contact with the cusps above referred to, which causes the anther cells to expand and discharge the pollen copiously. An insect acting in the same way would have its back dusted, and when visiting another flower, would necessarily rub off a portion of the burden upon the stigma. I thought the sharp cusps might tickle or prick any intruder and thus compel him to retreat. Dr. Gray, however, does not consider these projections sharp enough to annoy the bee, and moreover considers it improbable that the flower would be provided with a contrivance so manifestly to its disadvantage. There are "guiding lines" of orange dots leading towards the nectariferous hairs.

I have seen bees approach the front for a moment and then retire as if baffled. Most of them, however, begin operations at the back at once. They alight with the tail towards the open end of the flower and at once insert the head into the little hole. I have never seen them make the aperture, although it is difficult to find a blossom without one. Even the buds are often penetrated; out of a large number of flowers plucked at random from different plants in different localities, I cannot find one flower without the slit. I have got others to observe for me with the same result. It is a constant pleasure to watch the curious action of these bees.—W. W. BAILEY.

THE CONNECTICUT VALLEY BOTANICAL SOCIETY held its first annual meeting at Amherst, Mass., Oct. 1. This new Society was organized in June last, mainly through the efforts of Mrs. Maria

L. Owen, of Springfield, Mass., and begins with a membership of about twenty ladies and gentlemen.—*President*, Prof. C. H. Hitchcock, Hanover, N. H.; *Vice President*, Rev. H. G. Jesup, Amherst, Mass.; *Secretary*, Mrs. M. L. Owen, Springfield, Mass.

Various papers of interest were presented at the meeting by the President and other members; an account of recent explorations near the head waters of the Connecticut river was given by one who had just returned from that region; a number of rare plants were exhibited; and work was planned for the coming year which promises valuable results. The society bespeaks the sympathy and coöperation of all the working botanists throughout the valley of the Connecticut river.—H. G. J.

HERBARIUM PAPER.—The Naturalists' Agency purpose keeping herbarium paper for sale, in small quantities, and taking orders for it in larger quantities; both the white sheets for species, and genus covers, such as are used at the Gray Herbarium of Harvard University and by most of the principal botanists of the United States. Botanists and institutions now sending their orders for the white paper, for two reams or more, may be supplied at $5 per ream (unless the price of paper should meanwhile rise). Those who order after the first lot of paper is made will probably have to pay a higher price, as also will those who buy less than whole reams. The species paper sheets are 16⅜ × 11⅝ inches. Orders may also be sent for genus-covers. These are of Manilla paper, very thick, 16½ × 24 inches, *i.e.* a foot wide when folded. The price will depend somewhat upon the extent of the orders received, but will probably be about $7 a ream. Orders should be sent without delay to the Naturalists' Agency, Salem, Mass.

LITHOSPERMUM LONGIFLORUM ONLY L. ANGUSTIFOLIUM.—While collecting specimens of *Lithospermum longiflorum* Spreng., in fruit, I noticed that the plants were still producing *small* flowers. A gradual reduction could be easily traced, from the conspicuous early inflorescence of the erect stem, to the small corolla scarcely exceeding the calyx, borne by spreading branches later in the season. This summer state of the plant is clearly *L. angustifolium* Michx.! within the limits of our familiar flora of the northern states, therefore, we have not only two species, founded upon different periods of growth of the same plant, but one of these has even been separated from *Lithospermum* and made the type of a distinct genus, *Pentalophus* A. De C. It is a pity to lose the appropriate name of *longiflorum* but it must yield to the older one imposed by Michaux.—M. S. Bebb.

Rhexia Virginica L.—This species produces fusiform tubers and of course grows from them the following year. In the few books accessible to me here (Wethersfield, Conn.), "Gray's Manual," "Chapman's Flora S. U. S.," "Benth. and Hook. Gen. Pl.," no mention is made of this character of genus or species. Hence, I infer it is not generally known. Will botanists who can readily examine other species observe whether or not it is a generic character and let us know?—C. W.

Cleistogenous Flowers are produced late in the season, and almost exclusively by *Oxybaphus nyctagineus*, as observed by H. W. Patterson, of Oquawka, Illinois. In *Nyctaginia capitata*, of Texas, as cultivated in the botanic garden here several years ago, we noticed the opposite of this, *i.e.*, all the earlier flowers were cleistogenous.—A. G.

ZOOLOGY.

Notes on some of the Rarer Birds of New England.—The occurrence in New England of the birds here mentioned, and the nesting therein of many of them, will perhaps be of interest to some readers of the Naturalist:—

An ornithological friend, Mr. J. N. Clark, residing at Saybrook, Ct., writes me that the following species are found in numbers, and breed regularly, in that locality: *Icteria virens*, *Helminthophaga pina*, *Myiodioctes mitratus*, *Icterus spurius*, *Ammodromus maritimus*, *Myiarchus crinitus* and *Rallus crepitans*. He also observes in the nesting season *Helmitherus vermivorus*, but as yet has failed to find the nest. *Melanerpes erythrocephalus* also breeds, and a number remained with him all through last winter. Most of the above have usually been regarded only as rare and accidental visitors to the southern portions of New England, and the others as found but sparingly and locally in any section of it. The fact of the *blue-winged*, *yellow*, *worm-eating* and *hooded warblers* occurring constantly is, I think, of special interest. He sends me a specimen of *Seiurus Noveboracensis* and says, "I can testify that about the period of nesting they are most extraordinary singers." I think it possible, however, that the bird actually nesting with him